



DC-DC CONVERTER

4:1 WIDE INPUT RANGE, 5 WATTS

EXTRA LOW NOISE, DIP PACKAGE 1.25 × 0.80 × 0.40”
 TLB5 SERIES

FEATURES

- 4:1 Wide Input Voltage Range
- 1600 Vdc Input to Output Isolation
- 500 Vdc Output to Output Isolation for select Dual Output models
- Extra Low Noise: 10 mV p-p
- Remote Control
- Low Standby Power
- Over Current Protection
- Short Circuit Protection
- Under and Over Voltage Protection
- Six-Sided Continuous Shield
- Efficiency up to 89%
- Industry Standard DIP Package 1.25”×0.80”×0.40”
- Safety Approved UL60950-1, EN60950-1, IEC60950-1
- Built in EN55022 Class B Filter
- Compliant to RoHS II and Reach
- CE Marked

SELECTION GUIDE All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current @ Full Load mA	Input Current @ No Load mA	Efficiency %	Model Number	Maximum Capacitor Load µF
9 - 36	3.3	1515	6	81	TLB5-24S33	2200
9 - 36	5	1000	6	83	TLB5-24S5	1000
9 - 36	12	416	9	88	TLB5-24S12	220
9 - 36	15	333	10	88	TLB5-24S15	150
9 - 36	24	208	10	89	TLB5-24S24	100
18 - 75	3.3	1515	4	80	TLB5-48S33	2200
18 - 75	5	1000	4	83	TLB5-48S5	1000
18 - 75	12	416	4	86	TLB5-48S12	220
18 - 75	15	333	4	87	TLB5-48S15	150
18 - 75	24	208	6	88	TLB5-48S24	100
9 - 36	±5	±500	6	84	TLB5-24-5	±680
9 - 36	±12	±208	9	85	TLB5-24-12	±150
9 - 36	±15	±166	10	86	TLB5-24-15	±150
9 - 36	±24	±104	10	87	TLB5-24-24	±100
18 - 75	±5	±500	6	83	TLB5-48-5	±680
18 - 75	±12	±208	4	85	TLB5-48-12	±150
18 - 75	±15	±166	5	86	TLB5-48-15	±150
18 - 75	±24	±104	6	87	TLB5-48-24	±100
9 - 36	+5, +5	+500, +500	6	84	TLB5-24-5S	680
9 - 36	+12, +12	+208, +208	9	85	TLB5-24-12S	150
9 - 36	+15, +15	+166, +166	10	86	TLB5-24-15S	150
9 - 36	+24, +24	+104, +104	10	86	TLB5-24-24S	100
18 - 75	+5, +5	+500, +500	6	83	TLB5-48-5S	680
18 - 75	+12, +12	+208, +208	4	85	TLB5-48-12S	150
18 - 75	+15, +15	+166, +166	5	86	TLB5-48-15S	150
18 - 75	+24, +24	+104, +104	6	86	TLB5-48-24S	100

TLB5 Series

Input Specifications			Output Specifications		
Operating input voltage range, Vdc	9 Min., 24 Typ., 36 Max.	24Vin(nom)	Voltage accuracy, %	-1 Min., 1 Max.	
	18 Min., 48 Typ., 75 Max.	48Vin(nom)	Minimum load, %	10 Typ.	
Start-up voltage, Vdc	9 Max.	24Vin(nom)	Line regulation, %	-0.2 Min., 0.2 Max. Low Line to High Line at Full Load	
	18 Max.	48Vin(nom)		-1 Min., 1 Max. Vout1 _(Aux) Dual with Output Isolation No Load to Full Load	
Shutdown voltage, Vdc	8.5 Typ.	24Vin(nom)	Load regulation, %	-0.5 Min., 0.5 Max. Single Output	
	16 Typ.	48Vin(nom)		-1 Min., 1 Max. Dual Output	
Start up time, ms	Constant resistive load		Cross regulation, %	10% Full Load to Full Load, Dual with Output Isolation	
	50 Typ., 75 Max.	Power up		-0.5 Min., 0.5 Max. Vout2 _(Main)	
Input surge voltage, Vdc	Remote ON/OFF		Voltage adjustability, %	-1 Min., 1 Max. Vout1 _(Aux)	
	50 Max.	24Vin(nom)		Asymmetrical load 25%/ 100% FL	
Input filter	Common Choke		Ripple and noise, mVp-p	-3 Min., 3 Max. Dual Output	
	100 Max.	48Vin(nom)		-0.5 Min., 0.5 Max. Vout 2 _(Main) Dual with Output Isolation	
Remote ON/OFF, mA	Open or 3 - 12 Vdc	Positive logic, DC-DC ON	Temperature coefficient, %/°C	-6 Min., 6 Max. Vout 1 _(Aux) Dual with Output Isolation	
	Short or 0 - 1.2 Vdc	Positive logic, DC-DC OFF		-0.5 Min., 0.5 Max. Vout 2 _(Main) Single Output	
	-0.5 Min., 1 Max	Input current of Ctrl pin	Transient response recovery time, µs	-4 Min., 4 Max. Vout 1 _(Aux) Single Output	
	3 Typ.	Remote off input current		-10 Min., 20 Max. Single Output	
Over voltage protection, %			Over load protection, %	-10 Min., 10 Max. Dual Output, Dual with Output Isolation	
				10 Typ., 15 Max.	
Over load protection, %			Short circuit protection	Continuous, automatic recovery	
				-0.02 Min., 0.02 Max.	
Short circuit protection			Over voltage protection, %	250 Typ. 50% load step change	
				135 Typ. % of Vout(nom)	
			Over load protection, %	170 Typ. % of Iout rated; Hiccup mode	

General Specifications			
Isolation voltage, Vdc	1 minute	Input to Output	1600 Min.
		Input (Output) to Case	1600 Min.
		Dual with Output Isolation	500 Min.
Isolation resistance, GΩ	500Vdc		1 Min.
Isolation capacitance, pF			1200 Max.
Switching frequency, kHz			300 Typ.

Environmental Specifications			
Operating ambient temperature, °C	Without derating	-40 Min.	85 Max.
	With derating	85 Min.	100 Max.
Maximum case temperature, °C			105 Max.
Storage temperature range, °C		-55 Min.	125 Max.
Thermal impedance, °C/W	Natural convection		20 Typ.
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity		5% to 95% RH	

TLB5 Series

Physical Specifications	
Design meet safety standard	UL60950-1, EN60950-1, IEC60950-1
Case material	Copper
Base material	FR4 PCB
Potting material	Epoxy (UL94 V-0)
Weight	14.8g (0.52oz)
Dimensions	1.25" × 0.80" × 0.40" (31.8 × 20.3 × 10.2 mm)
MTBF	4.446×10 ⁶ hrs, MIL-HDBK-217F, Full load

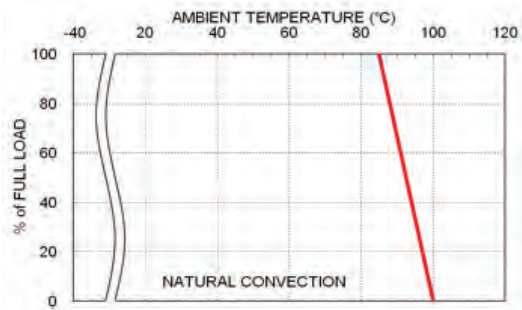
EMC Specifications			
Specifications	Conditions		Level
EMI ⁽¹⁾	EN55022		Class A
			Class B
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20V/m	Perf. Criteria A
Fast transient ⁽²⁾	EN61000-4-4	±2kV	Perf. Criteria A
Surge ⁽²⁾	EN61000-4-5	±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10Vr.m.s	Perf. Criteria A

Note:

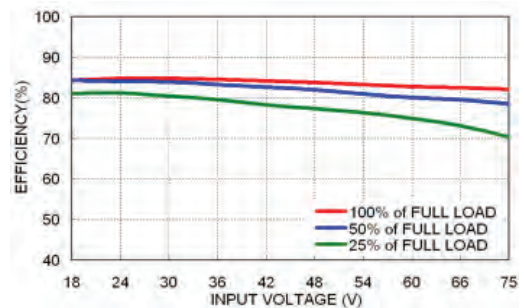
- The standard modules meet EN55022 Class A without external components.
The standard modules meet EN55022 Class B as following information: TLB5-24XXXX: Do not need any external components.
TLB5-48XXXX: Connect two 4.7µF/100V MLCCs in parallel to input pins.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The TLB5-24XXX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ70A, 70V, 3000 Watt peak pulse power) to connect in parallel. The TLB5-48XXX recommended an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) to connect in parallel.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

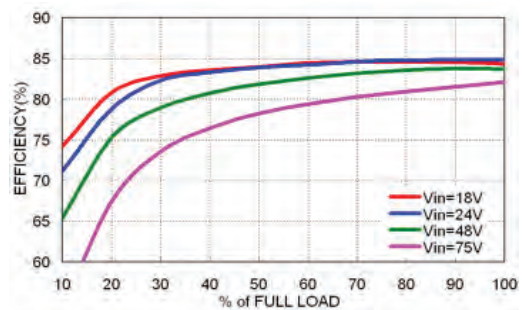
Characteristic Curve



TLB5-48S5 Derating Curve

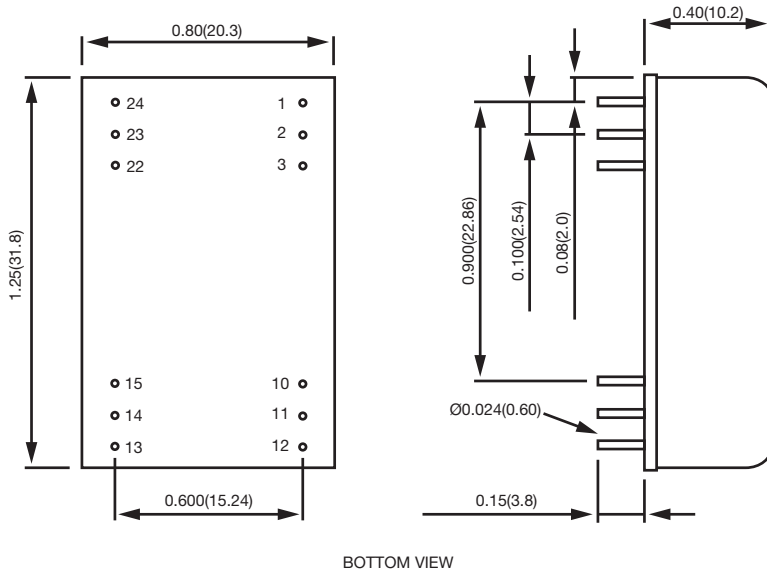


TLB5-48S5 Efficiency vs. Input Voltage



TLB5-48S5 Efficiency vs. Output Load

Mechanical Drawing



1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)

PIN CONNECTION

SINGLE			
PIN	Define	PIN	Define
1	+Vin	24	-Vin
2	+Vin	23	-Vin
3	Case	22	Ctrl
10	No pin	15	+Vout
11	No pin	14	-Vout
12	Case	13	Trim

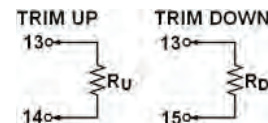
DUAL			
PIN	Define	PIN	Define
1	+Vin	24	-Vin
2	+Vin	23	-Vin
3	Case	22	Ctrl
10	Com	15	Com
11	+Vout 1	14	-Vout 2
12	Case	13	Trim

DUAL WITH OUTPUT ISOLATION			
PIN	Define	PIN	Define
1	+Vin	24	-Vin
2	+Vin	23	-Vin
3	Case	22	Ctrl
10	-Vout 1 ^(Aux)	15	+Vout 2 ^(Main)
11	+Vout 1 ^(Aux)	14	-Vout 2 ^(Main)
12	Case	13	Trim

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

SINGLE, DUAL WITH OUTPUT ISOLATION



DUAL

